

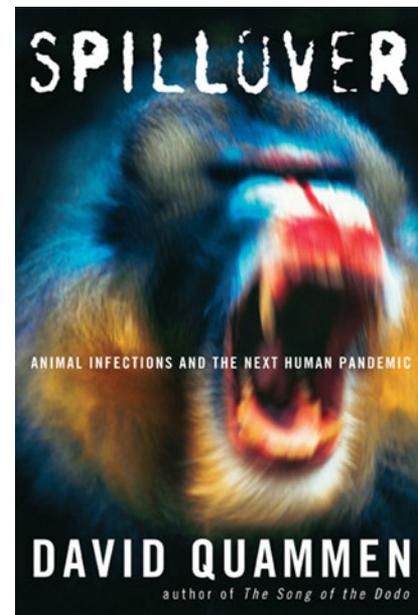
Book Review

Jumping Germs

BOOK REVIEW OF *SPILLOVER: ANIMAL INFECTIONS AND THE NEXT HUMAN PANDEMIC* (2012) BY DAVID QUAMMEN. W. W. NORTON & COMPANY

Avian influenza in Southeast Asia. Ebola outbreaks in Africa. Lyme disease in the US. Nipah in Malaysia. Many of the stories in David Quammen's book "Spillover" will be familiar to researchers in emerging infectious diseases. However, in assembling these examples, Quammen creates a stirring and cohesive description of the factors associated with cross-species transmission of pathogens. He explores the reasons why the number of emerging zoonotic pathogens appears to be on the rise and challenges the reader to imagine the future given current trends. The book is ambitious, taking on a great number of pathogens and disciplines. Throughout, Quammen's writing shines, describing complicated concepts in straightforward language. Although the target reader is someone with little knowledge of zoonotic infections, scientists in emerging infectious diseases will find this an entertaining and informative read as well.

Throughout the book, Quammen displays multiple writing gifts. He bounces easily between descriptions of ecological theory, historical aspects of discovery and character studies of present day researchers. Chapters take on similar construction without being repetitive: a short description of the history of a pathogen and its study, a description of some of the main characters involved in the investigation of the pathogen and a travelogue of Quammen's journey to meet those involved or to visit sites where spillovers have occurred. The chapters build upon each other showing a range of circumstances in which pathogens



can jump between species and contrasting the evolutionary strategies that pathogens have employed to be able to take advantage of opportunities to cross-species boundaries when they do strike.

The stories are dramatic, and Quammen's telling presses the urgency of understanding these pathogens and the humanities role in facilitating their jumps. At times the book has the feel of a collection of hard-boiled detective stories. Quammen's terminology is often coarse and informal. Characters are described briskly ("a tall man...sober and professional", or "smart, puckish" or "of mild demeanor, clean-cut appearance...and catholic tastes"). The mystery here is provided by the search for the cause of outbreaks when these novel pathogens appear.

Quammen imagines the solution to one mystery, how HIV emerged in humans, in retrospect. Quammen spends a good deal of the book imagining a detailed history, down to the moment the virus spilled from a chimpanzee to a hunter in central Africa and descriptions of the partners and travels of this unfortunate fictitious individual. It's an interesting device that helps to humanize theories on the path of emergence. This section is paired well with a description of the best data and theories on HIV emerged from chimpanzees.

Quammen has focused on key individuals involved in outbreak investigations or scientists engaged in the study of each pathogen. In researching the book he has invested a great deal of time and effort to accompany these individuals into caves, labs, wet markets and wherever else their studies take them. It is also apparent that he has understands the theory and the biological systems he describes. My one complaint is that he does not challenge the reader further by taking on more subtle aspects of the science he tackles. His explanations of critical community sizes and Eigen's paradox, for example, are clear and concise, but he is unnecessarily apologetic to the reader for technical detail. In fact, he could go much further without losing a more general audience.

Quammen does not limit himself entirely to zoonotic pathogens that infect humans. He also presents the story of the nucleopolyhedrovirus, a pathogen of caterpillars. This pathogen is lethal to the host caterpillars and transmits most effectively where the hosts occur at high densities. It

transmits so effectively that it can bring caterpillar populations to extremely low numbers within a few seasons of transmission. He offers this pathogen as a cautionary tale and speculates that the rapid increase in numbers and increasingly high densities of humans on the planet may also favor a rapidly spreading pathogen. The recurring themes of this book are that humankind's penetration, manipulation, and disruption of ecological systems facilitate the spillover of pathogens from animals to human populations. We can't know exactly how the story of mankind's interactions with infectious zoonotic pathogens will unfold in the coming decades, but Quammen emphasizes that it is time to take notice. Quammen warns the reader the "Next Big One", the question surrounding the next pandemic of an emergent pathogen, is not a matter of *if*, but rather of *when*. His warning is not meant to scare readers, but to urge us to prepare by increasing our knowledge of zoonotics and their ecology. We may not be able to predict the next important emergence, but by studying these systems, we might be more prepared.

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